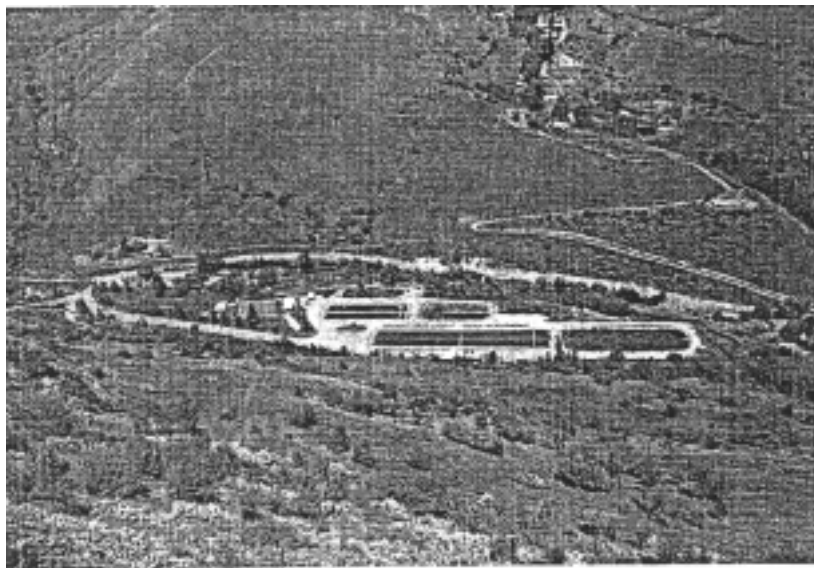




RAPID RIVER FISH HATCHERY

1998 BROOD YEAR REPORT



By

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ABSTRACT

Rapid River Fish Hatchery (RRFH) trap operated from March 11 to September 9, 1998. From May 20 to August 31, 1,591 marked chinook *Oncorhynchus tshawytscha* were collected. This included 1,584 (99.6%) adults and seven (0.4%) jacks. The adult sex ratio was 661 males (41.7%), 923 females (58.3%). The age-class structure was seven three-year-olds (0.44%), 262 four-year-olds (16.47%), and 1322 five-year-olds (83.09%). All 1,591 fish were ponded.

The Oxbow Fish Hatchery (OFH) trapped and transferred 60 marked adult chinook from Hells Canyon to RRFH. The adult sex ration of these fish was 29 adult males (48.33%), and 31 females (51.67%). The age-class structure was six four-year-olds (10.00%), and 54 five-year-olds (90.00%). These fish were marked for identification and ponded with the fish that returned to Rapid River.

There was a sport fishery on the Little Salmon River from June 5 through June 22, 1998. The Idaho Department of Fish and Game (Department) creel census estimated 168 chinook harvested. The Nez Perce Tribe conducted a fishery on Rapid River. Tribal harvest data is unavailable at this time.

Ancillary species were trapped in 1998. From May 26 to July 20, forty-two unmarked chinook were trapped and released into Rapid River above the trap. The age-class composition of the unmarked component of the 1998 salmon run was eight four-year-olds, and 34 five-year-olds. From March 23 to May 18, twenty-three wild and 36 hatchery steelhead *O. mykiss* were trapped. The sex ratio of the returning steelhead was seven wild males, 16 wild females, 20 hatchery males, and 16 hatchery females. Wild steelhead were released above the trap. Hatchery-produced steelhead were released into the Little Salmon River. From June 3 to August 4, 112 bull trout *Salvelinus confluentus* were trapped and released into Rapid River.

Prespawning mortality of the 1,651 fish placed in holding ponds was 98 adult males (5.9%), 165 females (10.0%) for a total of 263 fish or 15.9% of the fish held.

Spawning took place from August 18 to September 11, 1998. A total of 789 females were spawned. All females were tested for Bacterial Kidney Disease (BKD) by enzyme linked immunosorbant assay (ELISA). Eggs from 66 females with ELISA titers of 0.80 optical density (o.d.) or greater were culled. This left 3,409,130 green eggs (based on mechanical count) from 723 females. Average fecundity was 4,715 eggs/female. Survival to eye-up was 2,979,801 eggs or 87.4%. Of these, 510,848 eyed eggs from 126 females (0.25 o.d. - 0.79 o.d.) were transferred to Clearwater Fish Hatchery (CFH). The total inventory remaining at RRFH was 2,468,953 eyed eggs.

Marking of brood year 1998 fingerlings at RRFH took place from June 21 through July 1, 1999. There were 2,465,267 fish adipose fin (AD) clipped, and 338,752 marked with coded-wire tags (CWT). During February 2000, 47,663 fish were marked with passive integrated transponders (PIT tags) as part of the comparative survival study.

From March 15 to April 25, 2000, 2,462,354 smolts (128,486 lb) were released from RRFH. All were released into Rapid River. Survival from swim-up to release was 99.6%. Survival from marking to release was 99.9%. Feed conversion was 1.40.

INTRODUCTION

Funding Source

The RRFH was constructed in 1964 by Idaho Power Company (IPC) to mitigate for the loss of spring chinook salmon through construction of Brownlee, Oxbow, and Hells Canyon dams. Mitigation mandated by the Federal Energy Regulatory Commission (FERC) required IPC to transplant a run of spring chinook salmon from the Snake River to the Salmon River drainage and to provide funds for the annual production of three million spring chinook salmon smolts at this facility. These fish are designated for release into Rapid River and into the Snake River below Hells Canyon Dam. The RRFH is staffed and operated by the Department and funded by IPC.

Location

The RRFH is located in Idaho County seven miles southwest of Riggins, Idaho. It lies on Rapid River, a tributary of the Little Salmon River. Travel distance for salmon to the ocean is approximately 600 river-miles.

OBJECTIVES

The following are objectives of RRFH:

1. To produce three million spring chinook salmon smolts annually. The average size is to be approximately 20 fish/pound (fpp). These fish are to be released into Rapid River and the Snake River below Hells Canyon Dam.
2. To trap and spawn adult spring chinook salmon returning to Rapid River.
3. To evaluate various strategies and techniques for rearing spring chinook salmon.
4. To provide eggs and/or fry for supplementation purposes.

FACILITY DESCRIPTION

Fish-rearing facilities at RRFH consist of 50 double vertical stack incubators, 12 outdoor concrete raceways (6-ft x 90-ft), and six earthen rearing ponds (RP) with concrete side walls: RP-1A and RP-1B (42-ft x 188-ft each), RP-2A and RP-2B (35-ft x 197-ft each), and RP-2C and RP-2D (37-ft x 173-ft each). Holding facilities for adult salmon broodstock consist of one concrete holding pond (HP), HP-1 (80-ft x 25-ft), and one earthen holding pond, HP-2 (40-ft x 150-ft). These holding ponds provide space for up to 4,000 adult salmon prior to spawning. Production capacities by unit are listed in Appendix 1. Rearing space by unit is shown in Appendix 2.

The RRFH facilities include a fish trap located on Rapid River approximately 1.5 miles downstream from the hatchery. It is designed to trap and hold adult fish migrating upstream. The trap consists of a permanent wooden velocity barrier, a seven-step fish ladder, and a two-stage trap. Adult salmon can be transferred from the trap by means of an Alaska Steep Pass Ladder to a 500 gallon bucket that is lifted by an overhead hoist to a 1,000 gallon tank truck for transport to the hatchery. The trap facility allows unimpeded migration of anadromous and resident fish around the velocity barrier when trapping operations are not in progress.

RECOMMENDED FACILITY IMPROVEMENTS

Recently the gravity-flow system that provides backup water for incubation has deteriorated. Historically it provided enough water to supply to 38 incubator stacks. Currently the system is unreliable and is not used for incubation. Using a dye to trace the water, we have detected multiple breaks in the buried line. This is at least one of the causal factors. We use motorized pumps during power failures but the gravity system provided another dimension to our ability to supply water for incubation. The transition from electric pumps to the gravity supply was immediate and automatic. Switching to motorized pumps is a manual operation and requires hatchery personnel to monitor incubation water 24 hours/day throughout the entire incubation period. We believe restoration of this capability to be a high priority and critical to the integrity of our incubation plan.

We have identified two areas for improvement of the facility. One relates to adult salmon handling and the other to general hygiene and disease control. Average prespawning mortality at RRFH from 1970 to 1994 was 18.3%, with holding in all ponds. Examination of prespawning mortality records show that a sharp increase occurs after first sort and subsequent handling of the adults. Our current method of gathering fish for sorting involves netting all adult fish in a large seine each spawn day. This method causes severe handling stress twice each week during the spawning season. An improved system for crowding adult fish would reduce prespawning mortality. This approach would require modification of HP-2 to provide a better environment for holding adult salmon. The other area of improvement involves the way in which water is supplied to RP-1. All water entering RP-1 must pass through the raceways. When fingerlings are in the raceways, RP-1 receives their effluent. This can be a sanitation problem if detritus from sweeping raceways is directed into RP-1. Direct supply to RP-1 would solve this problem however, the handling of fish waste from all rearing systems remains. This question must be addressed as the Environmental Protection Agency (EPA) re-evaluates hatchery discharge permits.

WATER SUPPLY

Water Source

Rapid River originates in Adams County and flows through an undeveloped canyon before reaching the hatchery. The drainage is protected as part of the Wild and Scenic Rivers Act. It is not subjected to perturbations, such as logging or road building. Rapid River generally provides adequate water for rearing salmon. The steep nature of the drainage makes it a highly variable

river. Spring runoff and flash floods can be violent and carry tons of silt into the hatchery. Water flow data for Rapid River are recorded by the National Forest Service (NFS) but are not available for the spring of 1998 at this time. We estimate that high water during the spring of 1998 peaked at more than 1,000 ft³/s and remained high well into June. Rapid River crested several times between January and mid-June. Water temperature also varies considerably. The minimum in January 1998 was 33.1°F, and the maximum in August 1998 was 57.9°F. Pond temperatures during adult holding are shown in Appendix 3.

Water Supply

Hatchery water is obtained through one 30-inch and one 24-inch pipeline. A 5-ft-high wooden diversion dam provides the necessary hydraulic head. Under a state license, RRFH has specific water rights to 28 ft³/s for the hatchery facility and 18.6 ft³/s for the fish trap. This water is diverted from Rapid River and then returned after passing through the hatchery. Rearing units operate on gravitational flow. Water for the incubation system is pumped from the headrace by one of two 5600-W electric pumps. A gasoline-operated pump and a gravitational-flow filter bed provide water during electrical failures. Water quality parameters are listed in Appendix 4. Effluent is monitored according to EPA guidelines.

STAFFING

Three permanent employees, a Fish Hatchery Manager II, an Assistant Fish Hatchery Manager, and a Fish Culturist staff RRFH. Approximately five seasonal employees are hired each year. Housing accommodations include three residences for the permanent staff and a 65-ft x 14-ft mobile home for seasonal employees.

FISH PRODUCTION

Adult Collection

Spring Chinook Salmon Returns to Rapid River

The RRFH fish trap operated from March 11 through September 9, 1998. Water conditions were benign for Rapid River during the steelhead and salmon runs, and did not inhibit fish migration. As in past years, the trapping operation was interrupted periodically for sand removal. This year the trap was never closed for more than a few hours at a time. Trapping was suspended at night several times during storms due to turbidity, and debris. These conditions and the associated cleanup required closure of the trap less often than usual this year.

The first marked chinook was trapped on May 20 and the last on August 31, 1998. The majority of the run followed a sharp normal curve with a depression during the first three weeks of June concurrent with heavy tribal fishing pressure in Rapid River. The last week of June marked the peak of the run after tribal fishing ended (Appendices 5 and 6).

Marked chinook collected for spawning purposes were transported to holding ponds at the hatchery. Trapping statistics, including fork lengths, injuries, marks, and tags were recorded for Rapid River returns at the trap. This year 1,591 marked chinook (1,584 adults and seven jacks) were trapped and ponded. Marks consisted of 1,573 adipose (AD) fin clips and 18 left ventral (LV) fin clips. A total of 60 marked (all AD clips) were received from OFH this year, which brought the total number of fish in holding at RRFH to 1,651. This year we combined holding of the Rapid River returns with fish that returned to the Snake River. All Hells Canyon returns received two left-operculum punches to identify them at spawning. This allowed us to separate sex ratios and age-classes for the two groups. Fork lengths were measured at trapping and again at spawning. The lengths taken after spawning were used to generate length-frequencies and age-class criteria. Sex ratios were determined after spawning because sexual dimorphism is not evident until mid-summer. The sex ratio of the 1,584 marked adult Rapid River fish was 661 adult males (41.7%) and 923 females (58.3%). Polymodal analysis of length-frequencies was used to determine age-class criteria. Age-class composition of the 1,591 Rapid River fish was seven (0.44%) three-year-olds (<59 cm), 262 (16.47%) four-year-olds (59 cm-77 cm), and 1,322 (83.09%) five-year-olds (>77 cm) (Appendices 7 and 8).

Ancillary species were collected, recorded, and released. Unmarked chinook, unmarked steelhead and bull trout were released into Rapid River above the trap, and marked steelhead were released into the Little Salmon River about one mile above its confluence with Rapid River. All fish released received a caudal fin punch to identify recaptures.

Tag information was recorded for all fish entering the trap. A total of 31 Passive Induced Transponders (PIT-tags) were detected (Appendix 9). There were 18 salmon with jaw tags trapped (Appendix 9). Another 23 chinook arrived at Rapid River with radio transmitters and visual (VI) tags (Appendix 10). We detected CWT in 199 of the 1,591 fish trapped.

Injuries were documented throughout the trapping season. When multiple injuries were present on the same fish, they were recorded separately. Injuries consisted of 150 nitrogen burns, 26 gill net scars, 18 gaff wounds and 170 other types of injuries (Appendix 11). This year we found 22 fishhooks in trapped fish.

Hells Canyon Spring Chinook Salmon Returns

Personnel from IPC transported 60 chinook from the OFH trap to RRFH. All of these were marked fish. The age-class composition was six (10%) four-year-olds, and 54 (90%) five-year-olds. The sex ratio was 29 (48.33%) adult males, and 31 (51.67%) females. For more information see the *Oxbow Hatchery Spring Chinook Salmon Run Report for 1998*.

Inventory of Miscellaneous Species

Unmarked chinook entered the trap from May 26 through July 20, 1998. The timing of this part of the run is shown in Appendices 6 and 12. This Year all 42 unmarked salmon were adults. They were measured to the nearest centimeter fork length (Appendices 8, and 13), injected with antibiotic, scanned for PIT-tags and then released above the trap into Rapid River. All released salmon received a caudal fin punch to identify recaptures. Age-class composition of this part of the salmon run was eight (19.5%) four-year-olds (97.63%), and 34 (80.95%) five-year-olds. The sex ratio was 28 (66.67%) males and 14 (33.33%) females.

From March 23 through May 18, 1998, fifty-nine adult steelhead were trapped (Appendices 14 and 15) and measured to the nearest centimeter fork length (Appendices 16 and 17). The steelhead run included 23 wild fish and 36 hatchery fish. The sex ratio was seven wild males, 16 wild females, 20 hatchery males, and 16 hatchery females. Scale samples were collected and steelhead were scanned for tags. Hatchery steelhead were transported back to the Little Salmon River and released approximately one mile upstream from its confluence with Rapid River. Wild steelhead were released into Rapid River upstream from the trap. The released steelhead received a caudal fin punch to identify recaptures.

A total of 112 bull trout were trapped from June 3 through August 4, 1998 (Appendices 18, and 19). These fish ranged in size from 33 cm to 65 cm total length (Appendices 20 and 21). Department researchers continued a study of bull trout movement this year. Hatchery personnel assisted them with implanting PIT-tags, marking, and various other aspects of their study. The NFS provided one person to collect data. Further information regarding this study should be obtained from the Department Research Office or the NFS office in Boise Idaho. An inventory of all species trapped in 1998 is shown in Appendix 22.

Sport and Tribal Fishery

In 1998 a sport fishery was held on the Little Salmon River from June 5 through June 22. The Department creel census estimated 172 marked chinook were harvested. For more information regarding the sport fishery on the Little Salmon River, contact the Department McCall Subregion Office. Nez Perce Tribal officials did not report harvest numbers however examination of the run timing curve (Appendix 6) shows a sharp increase in fish entering the trap after the cessation to tribal fishing. This suggests an impact on returns to the hatchery.

Holding and Spawning

Adult Treatments

Hatchery personnel removed fish from the trap daily and processed them on site. They were handled as little as possible and processed while the fish were immersed. All chinook placed in holding or released above the weir were anesthetized with 40 ppm MS-222, measured to the nearest centimeter fork length, and given an intraperitoneal injection of Erythromycin-base injectable (Gallimycin-100) at 20 mg/kg body weight. The antibiotic was administered according to veterinary

extra-label usage as prescribed by Dr. Dave Hunter at the Department Caldwell Wildlife Laboratory. After processing, the fish were transported to the hatchery in oxygenated water and released into HP-2.

The holding period extended from May 20 to September 12, 1998. The fish received from OFH were marked with two left-operculum punches to identify them. Formalin treatments were administered three times each week from June 15 through September 3. Treatments consisted of precharging the pond with formalin to 170 ppm and then introducing formalin into inflow water at a rate of 170 ppm for one hour. During the holding and spawning period, water temperatures ranged from 40.1°F to 59.4°F (Appendix 3). Carcasses were frozen then hauled to a landfill in Montana twice each week by the Walco Company.

Prespawning Mortality

The combined prespawning mortality for Rapid River and Hells Canyon chinook was 263 fish or 15.9% of the 1,651 fish ponded. After August 23, males were not considered part of the prespawning mortality. The sex ratio was 98 adult males (5.90%), 165 females (10%).

Hatchery personnel did routine necropsies of all prespawning mortalities. Causal factors for prespawning mortality are shown in Appendix 23. This year prespawning mortality approached the hatchery average (the average from 1970 through 1994 was 18.8%). The greatest single factor was nitrogen emboli (9.1% of fish held), followed by unknown causes (5.8%). To assess the importance of nitrogen supersaturating we recorded the percent of the fishes head effected by emboli for fish where this was the causal factor for mortality (Appendix 24). Part of the cause for mortality recorded as unknown is handling stress. Factors influencing this include holding in HP-2 (mud and rock substrate), and crowding with nets rather than racks. In 1995 and 1996 all holding was in HP-1 and fish were crowded with racks. Prespawning mortality for those two years was below eight percent. In 1997, 83% of holding was returned to HP-2 and prespawning mortality increased to 10.4%. This year all fish were held in HP-2 and mortality was 15.9%. The increase may coincide with the return to HP-2 and an increase in handling stress. A profile of cumulative prespawning mortality as percent of fish held is shown in Appendix 25. Snouts were collected from 199 fish in which a CWT was detected and sent to the Department Fish Marking Laboratory at Lewiston, Idaho.

Salmon Spawning

In 1998, 789 female chinook were spawned from August 18 to September 11. The eggs from 66 females were culled as part of a disease management program. About 311,190 eggs (based on an average fecundity of 4,715 eggs/female) were culled. The remaining 723 females produced 3,409,130 green eggs (based on mechanical counts). Complete egg enumeration and disposition data are compiled in Appendix 26. Each female was sampled during spawning for BKD analysis. The results of ELISA tests are shown in Appendix 27.

Spawning followed standard procedure recommended by the Integrated Hatchery Operations Team (IHOT) for random cross of two males per female. This procedure was followed to ensure that all females were fertilized with a fertile male. Females were killed with a blow to the head. The eggs from each female were put in a colander to drain off the ovarian fluid. Then they

were transferred to a bucket where they were fertilized with the milt from two males and mixed with approximately 250 ml of temperature-adjusted well water. Jacks were included for fertilization, and no male was used more than three times. Males were given a right-operculum punch to identify them as having been spawned and then returned to the holding pond. All fertilized eggs were water hardened for 30 minutes in 100-ppm iodophore. After water-hardening, green eggs were placed in vertical stack incubators that were set to a flow rate of 6 gal/min.

Incubation

The 1998 egg take was 3,409,130 green eggs from 723 females (after culling 66 females). The average fecundity was 4,715 eggs/female. After primary pick of 429,329 bad eggs, 2,979,801 eyed eggs remained. Eye-up was 87.4%. Eggs were incubated at a rate of one female per tray to segregate individual fish pending results of ELISA studies.

After the ELISA results were received, eggs from females with ELISA titers of 0.80 o.d. or greater were culled and discarded. In 1998, 63 of the 789 females spawned tested high (≥ 0.80 o.d.). These females produced about 297,045 eggs (based on average fecundity of 4,715 eggs/female) which were culled. Three more were erroneously reported as high and about 14,145 more eggs were culled. Another 126 females tested moderate (0.25 o.d.-0.79 o.d.). They produced 593,848 green eggs (based on mechanical count). After counting and primary, pick of 82,672 bad eggs, the remaining 510,848 eyed eggs were transported to CFH for isolated incubation. The eggs were transferred in chilled water in EggTUBE containers manufactured by the AquaSeed Corporation. The containers were placed in EggBOX coolers and transported by RRFH personnel. This group had an average eye-up of 86.1% and the average fecundity of the 126 females was 4,710 eggs/ female. The remaining 2,468,953 eyed eggs were retained at RRFH. These came from 2,815,610 green eggs taken from 597 females that tested low (<0.25 o.d.). Eye-up for this group was 87.7% and average fecundity was 4,716 eggs/ female.

Eggs reared at RRFH were shocked at 500 daily temperature units (DTU) by pouring them from the trays into water. They were picked two days later using a salt bath. A Jensorter egg counter was used to inventory eggs. After counting, the eggs were returned to clean trays. At 1,000 DTU trays were picked again, and a third pick was performed at 1,500 DTU. All trays were rodged weekly after 300 DTUs. Formalin was administered to each incubator stack at a rate of 1,667 ppm (1:600) for 15 minutes to retard external mycosis. This procedure was discontinued after each lot accumulated 800 DTUs. Mycosis was controlled, and fry were ponded at approximately 1750 DTUs.

Early Rearing

Fry were ponded from January 1, through March 8 1999. The first lot was initially placed in our two indoor vats and then transferred to a raceway when the next lot reached 1750 DTU. The remaining fry were placed in nine raceways. Initially, the raceways were densely loaded to facilitate feed training. After the fish were acclimated to the raceway environment and were feeding well, the volume was increased to lower Density Indices (DI) (Piper et al. 1982) below 0.2. Initial water depth was 24 in, and flow was adjusted to 0.6 ft³/s. As the fish grew, water depth and flows were increased to a maximum depth of 36 in and flow of two ft³/s. The fingerlings remained in the raceways until marking when they were transferred to rearing ponds. The average weight at the

start of marking on June 15, 1999, was 162 fpp and ranged from 126 fpp to 324 fpp. Average DI and Flow Index (FI) (Piper et al. 1982) were 0.48 and 1.25. Initial raceway density is shown in Appendix 28, and final raceway density is shown in Appendix 29. Mortality during early rearing was 12,680 fish or 0.5% of the total of inventory reported at marking plus the mortality recorded prior to marking.

Final Rearing

Rearing ponds were disinfected with a chlorine bath at 200 ppm before fish were ponded. The fingerlings were transferred from raceways to ponds through 4-inch irrigation pipe. The marking crew reported that 2,465,267 fingerlings were marked and moved from June 21 through July 1, 1999. This total is an increase of 2.5% from hatchery inventory for the raceways. As in the past, hatchery inventory numbers were adjusted to the number reported marked. Initial pond loading densities are reported in Appendix 30. Fingerlings were ponded at a mean length of 2.9 in and grew to 5.4 in by release. Average DI before volitional releases began on March 15, 2000, was 0.16, and the average FI was 1.30 (Appendix 31). The maximum DI recommended by the Department is 0.30. The maximum recommended FI for O₂-saturated water at 41°F and 2,100 ft above sea level is 2.42. These parameters were within prescribed limits. Mortality during final rearing was 2,913 fish or 0.1% of the combined inventory of those reported at marking, those recorded as mortalities prior to marking. Total mortality from swim-up through release was 14,863 fish or 0.6%.

Feed Use and Conversion

A total of 180,556 lb of feed was used for Brood Year 1998 fish. The overall feed conversion was 1.40. Specific data on feed types and sizes are listed in Appendix 32.

Two medicated feed treatments were administered to Brood Year 1998 fingerlings. Starting May 14, 1999, and continuing for 28 days, they were fed 2.25% Aquamycin-100 at a rate of 2.2% body weight/day to yield a dose of 100 mg Erythromycin per 45 kg body weight/day. Then starting September 16 1999, and continuing for 28 days, they were fed 4.5% Aquamycin-100 at a rate of 1.1% body weight/day to yield a dose of 100mg Erythromycin per 45 kg body weight/day. Treatments were performed according to guidelines set forth in Investigational New Animal Drug (INAD) #6013/4333 and were followed by toxicity testing.

Fish Health

Portions of this section of the *Rapid River Hatchery 1998 Brood Year Report* are reproduced with permission from Mr. Doug Munson of the Eagle Fish Health Laboratory. A summary of Eagle Health Laboratory results for individual inspections of brood year 1998 juveniles and broodstock is shown in Appendix 33.

Diseases Encountered and Treatment

The RRFH did not experience losses due to an epizootic of infectious agents in Brood Year 1998 fish during 1999 and 2000. These fish were treated with prophylactic erythromycin medicated feed, under INAD 6013/4333, to reduce the chance of an epizootic of BKD. Losses to other bacterial, viral, and mycotic agents were minimal.

Organosomatic Index

The Organosomatic Index in this context is a measure of fish health developed as part of the Autopsy-Based Fish Health/Condition Assessment System (Goede and Houghton 1987). A summary of the fish autopsy is shown in Appendix 34.

Acute Losses

No acute or chronic losses occurred during the rearing of Brood Year 1998 chinook at RRFH.

Other Assessments

The chinook produced at this facility during this brood year were in excellent condition and preliberation sampling demonstrated low amounts of *Renibacterium*, and did not detect viral replicating agents or *Myxobolus cerebralis*, the causative agent of whirling disease. Once again, external mycosis was not a problem at this facility.

The RRFH needs a modern brood holding facility. This would certainly reduce stress on holding, handling, and spawning adult chinook. A modern holding facility would reduce prespawning mortalities and ELISA titers for *Renibacterium*. This would give RRFH greater flexibility in culture management and less dependency on CFH to raise high BKD segregation groups.

Fish Marking

Protocol requires the adipose fin to be removed from all hatchery-reared salmon. The marking crew reported 2,465,267 fish were AD clipped and CWTs were placed in 338,752. Marking occurred from June 21 to July 1, 1999. After marking, fish were sampled monthly for a quality check of AD clips. A total of 2,880 fish were sampled. The results showed 90% with full clips, 3% without clips, and 7% with marginal clips. PIT-tags were placed in 47,663 fish from February 7 through February 10, 2000. During the remainder of the final rearing period, all mortalities from RP-2B were scanned for PIT-tags.

Specific release information about marked fish is presented in Appendix 35. For more information regarding marking consult the *Annual Release Summary of Marked Salmon and Steelhead* published by the Department.

Fish Distribution

Egg Transfers

During 1998, 510,848 eyed-eggs from 123 females were transferred to CFH for isolated incubation and rearing. Smolts from these eggs were released at the RRFH trap by CFH personnel. from March 6 through March 10, 2000. For more information about this release contact CFH.

Fingerling Transfers

No brood year 1998 fingerling transferred to or from RRFH.

Smolt Releases

There were 2,462,354 smolts (128,486 lb) released from RRFH in 2000. All of these were released into Rapid River at the hatchery. Releases took place from March 15 through April 25, 2000. Release data are reported in Appendix 36.

Final sample counts were taken at the start of volitional smolt releases on March 15, 2000. Smolts averaged 19.2 fpp and 5.4 in fork length. Rearing densities at the time of release are listed in Appendix 31. Based on visual observations, we estimated that about 99% of the smolts emigrated volitionally. The remaining fish were seined from the ponds. The last fish emigrated on April 25. Survival from marking to release was 99.9% (Appendix 37).

Cost of Production

The total cost of production for any specific brood year is not a straightforward calculation. At RRFH, the rearing cycle is 19 months. For any brood year, the cycle extends from September, when spawning starts, through March, nineteen months later when the smolts are released. Cost of production has been reported as the total cost incurred by IPC for the entire 19-month period. Overlap in brood year classes causes the expenditure for September through March of the first year and the expenditure for September through March of the second year to be reported twice. The result is inflated estimates of production cost. Our traditional method reports total cost for 14 of the 19-month rearing cycle in three successive brood year reports. Thus, we report inflated production cost figures because we report the total cost paid by IPC for the entire period rather than costs associated with production of a given brood year. To address this problem, IPC has supplied us with total cost broken down by month (letter dated July 14, 2000, from Paul Abbott, IPC Hatchery Biologist, P.O. Box 70, Boise, Idaho). One approach would be to apportion each month's cost by the percentage that a given brood year's fish comprise of the total hatchery inventory. In our report for brood year 1995, we proposed this apportionment plan and compared total cost. The method would have resulted in reporting cost numbers only once. The resulting cost per pound that year was one third the cost calculated using the old method. At the March 8, 1996, IHOT evaluation meeting, we were directed to continue to use the old method to be consistent with data from

previous years. We recommend a future meeting with further discussion on this concern. For now, we continue to report total cost paid by IPC for the entire period.

The total cost paid by IPC for September 1, 1998, through March 30, 2000, was \$1,100,659.34 (letter dated July 14, 2000, from Paul Abbott, IPC Hatchery Biologist, P.O. Box 70, Boise, Idaho). This was used to calculate the cost of production data listed in Appendix 38. For comparison, the total cost apportioned by percent of total monthly inventory for the same period was \$782,479.26. This is 29% less than the total cost and addresses the problem of reporting the same dollars twice. Using this method cost/thousand fish went from \$447.00 to \$317.78 and cost/pound went from \$8.57 to \$6.09.

HISTORICAL INFORMATION

As always, we have included some archival information for context. Historic information about returns by return year is listed in Appendix 39 and by brood year in Appendix 40. Average feed and growth statistics are listed in Appendix 41. Release and transfer information is listed in Appendix 42.

ACKNOWLEDGMENTS

The crew at RRFH would like to thank Mr. Paul Abbott and the fisheries staff at IPC for their support and assistance in helping us maintain and improve the hatchery facility. We would also like to thank Department personnel who helped us during the spawning season. Our gratitude goes to Officer Brian Holbrook and other conservation officers for security at the hatchery and trapping facility. In addition, we extend our appreciation to Doug Munson and the Eagle Fish Health Lab staff for diagnostic work at the hatchery and assistance in preparing this document. This team effort helps Rapid River continue to be a successful hatchery.

LITERATURE CITED

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- Piper, P. G., I. B. McElwain, L. E. Orme, J.P. McCraren, J.R. Leonard. 1982. Fish hatchery management. United States Department of the Interior Fish and Wildlife Service, Washington D.C.

APPENDICES

Appendix 1. Rapid River Hatchery production capacity.

Rearing unit	Volume	Carrying capacity
Incubators	800 Trays	3,200,000 Eggs
Raceways (12)	1,890 ft ³	3,800,000 Fry
Rearing Ponds 1	54,625 ft ³	1,000,000 Smolts
Rearing Ponds 2	92,827 ft ³	2,000,000 Smolts
Adult Holding Pond 1	12,000 ft ³	1,000 Adults
Adult Holding Pond 2	24,000 ft ³	3,000 Adults

Appendix 2. Rapid River Hatchery pond volume.

Rearing/holding area	Volume (ft ³)
Rearing pond 1A	27,496
Rearing pond 1B	27,129
Rearing pond 2A	23,858
Rearing pond 2B	22,607
Rearing pond 2C	22,468
Rearing pond 2D	23,894
Adult holding pond 1	12,000
Adult holding pond 2	24,000

Appendix 3. Rapid River Hatchery adult holding pond temperatures (°F) for 1998.

Month	Maximum	Minimum	Average	Ten-year average
April	48.7	40.1	43.9	45.0
May	49.1	40.8	44.4	46.6
June	50.4	43.7	46.8	50.9
July	59.4	49.1	53.6	54.3
August	58.3	50.4	54.1	55.8
September	58.5	48.7	42.6	51.4

Appendix 4. Rapid River water quality analysis.

Analyte	PQL	Result	Units
Nitrate/N	0.05	ND	Mg/L
Nitrite	0.05	ND	Mg/L
Sulfate	1	14	Mg/l
Orthophosphate	0.05	ND	Mg/L
Ammonia/N	0.5	ND	Mg/L
Alkalinity	10	74	mg/L as CaCO ₃
Hardness	10	80	mg/L as CaCO ₄
pH		7.63	
Hydrogen Sulfide	0.2	ND	Mg/L
Chlorine	0.1	ND	Mg/L
Arsenic	1	ND	Ug/L
Cadmium	1	ND	Ug/L
Chromium	1	ND	Ug/L
Mercury	1	ND	Ug/L
Lead	1	ND	Ug/L
Selenium	1	ND	Ug/L
Silver	1	ND	Ug/L
Iron	30	120	Ug/L
Zinc	1	51	Ug/L
Copper	1	ND	Ug/L
Aldrin	0.1	ND	Ug/L
Endrin	0.1	ND	Ug/L
Dieldrin	0.1	ND	Ug/L
Heptachlor	0.1	ND	Ug/L
Chlordane	0.1	ND	Ug/L
Methoxychlor	0.1	ND	Ug/L
Lindane	0.1	ND	Ug/L
Guthion	0.1	ND	Ug/L
Malathion	0.1	ND	Ug/L

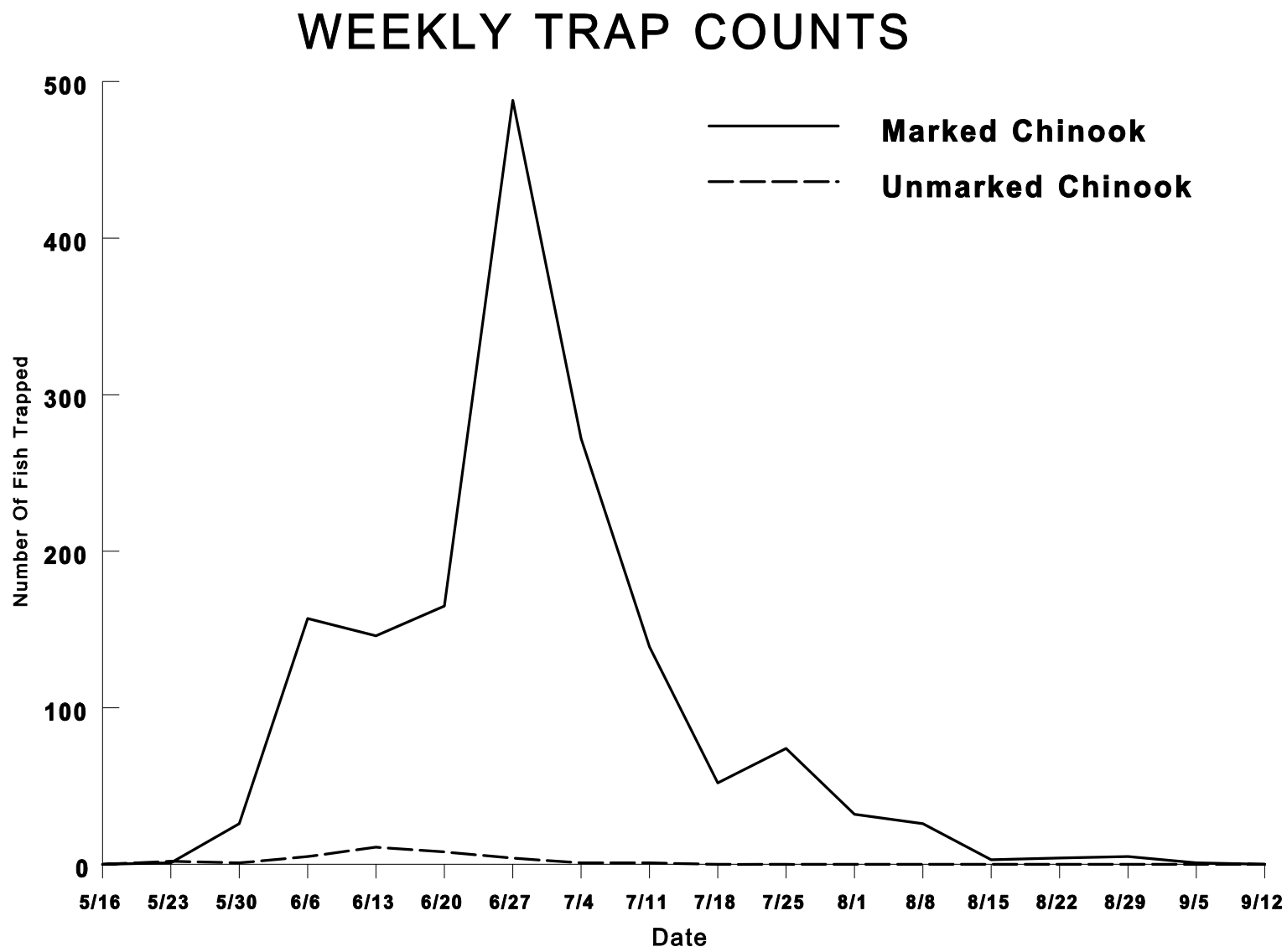
PQL = Practical Quantitation Limit

ND = not detected(< PQL)

Appendix 5. Rapid River marked chinook run timing for 1998.

Week ending	Number of fish	Percentage of marked chinook
May 16	0	0.00
May 23	1	0.06
May 30	26	1.63
June 6	157	9.87
June 13	146	9.18
June 20	165	10.37
June 27	488	30.67
July 4	272	17.10
July 11	139	8.74
July 18	52	3.27
July 25	74	4.65
August 1	32	2.01
August 8	26	1.63
August 15	3	0.19
August 22	4	0.25
August 29	5	0.31
September 5	1	0.06
September 26	0	0.00
Total	1591	100.00

Appendix 6. Adult salmon returns to Rapid River during 1998.

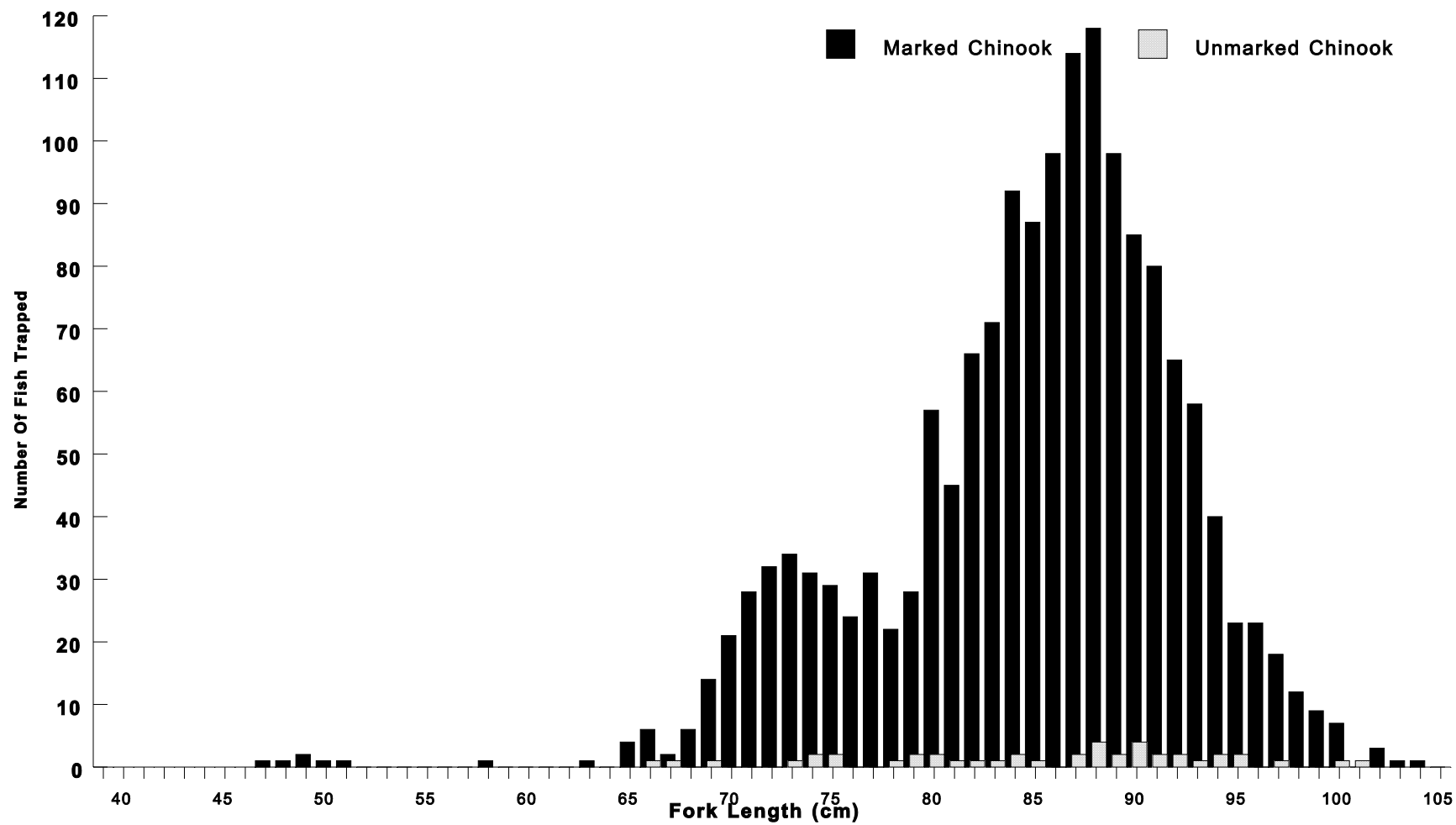


Appendix 7. Rapid River spring chinook lengths for 1998.

Fork length (cm)	Number of fish	Fork length (cm)	Number of fish
47	1	88	118
48	1	89	98
49	2	90	85
50	1	91	80
51	1	92	65
52	0	93	58
53	0	94	40
54	0	95	23
55	0	96	23
56	0	97	18
57	0	98	12
58	1	99	9
59	0	100	7
60	0	>100	5
61	0	Total run	1,591
62	0		
63	1		
64	0	Adult sex ratio	
65	4		
66	6	661 (41.7%)	males
67	2	923 (58.3%)	females
68	6	1,584 (100.0%)	*Total
69	14		
70	21		
71	28		
72	32	Age-class data	
73	34	7 (0.44%)	three-year-old
74	31	262 (16.47%)	four-year - old
75	29	1,322 (83.09%)	five-year - old
76	24	1,591 (100.00%)	Total
77	31		
78	22		
79	28		
80	57	Age-class criteria	
81	45	<59 cm =	three-year old
82	66	59 - 77 cm =	four-year-old
83	71	> 77 cm =	five-year-old
84	92		
85	87		
86	98		
87	114		

* Total adult Rapid River returns

Appendix 8. Length-frequency of adult salmon returning to Rapid River for 1998.



Appendix 9. Chinook recaptures with jaw and PIT-tags for 1998.

Recapture date	Sex	Fork length (cm)	VI tag number	Jaw tag number	Pit tag number	fin clip	Comments
6-2-98	U	68	RE5		2048100800	AD	
6-10-98	U	88		C3264	22512B6375	AD	
6-20-98	U	84		C4100	225F07384E	AD	
6-22-98	U	76	RB8		2232214068	AD	
6-22-98	U	78		C3278		NONE	unmarked fish, released into Rapid River
6-24-98	U	88		C5007	224F067E2B	AD	
6-24-98	U	84		C3270	225F67541E	AD	
6-24-98	U	75		C2345	41694E0F7A	AD	
6-24-98	U	92		C4113	225D03200D	AD	
6-24-98	U	79		C3286	2250507923	AD	
6-24-98	U	84		C3266	22611C5B1F	AD	
6-25-98	U	70	RE7		20087B7568	AD	VI, No radio
6-25-98	U	84		C3276	2262363317	AD	
6-25-98	U	92			225069453A	AD	Appeared to have lost jaw tag
6-25-98	U	88		C3272	224F4E4A7A	AD	
6-25-98	U	89		C3283	22506C0C3E	AD	
6/27/98	U	68		C1034	415238465B	AD	
6-29-98	U	80			2213227152	AD	
6-29-98	U	67			7F7A13304E	AD	
6-29-98	U	89		C2330	2249471A15	AD	Fish had 2 PIT tags
					2251061B6F		
6-29-98	U	88			1F6C263E11	LV	CWT,
7-1-98	U	81		C3274	225C1A120F		
7-2-98	U	89			20441D324D	AD	
7-4-98	M	50			22315B2605	AD	Jack
7-6-98	U	64	RE6		2037672D15	AD	VI, No radio
7-6-98	U	75	RB1		1F6B341032	AD	VI, No radio
7-9-98	U	86		C3297	2263091739	AD	
7-17-98	U	91			204418651F	AD	
7-21-98	U	73			202E764B71	AD	
7-24-98	U	69		C1040		AD	No PIT tag
8-6-98	U	92		C5038	224E715275	AD	
unknown	M	90			225C3F0169	AD	Detected in pond mort 9/3/98

Appendix 10. Adult recaptures at Rapid River trap with VI and radio tags for 1998.

Recapture date	Fork length (cm)	VI tag number	Radio CH/Code	Fin clip	Comments
4-23-98	74	YS3	48/121	none	Steelhead
5-29-98	71	NM2	23/29	AD	
6-2-98	86	LV1	23/46	AD	
6-4-98	85	NY6	23/72	AD	
6-10-98	65	NP2	23/31	AD	
6-14-98	68	NX1	25/02	AD	
6-19-98	70	LP2	24/128	AD	
6-23-98	70	JP3	11/110	AD	
6-24-98	84	LV2	25/125	AD	
6-24-98	84	LT1	24/102	AD	
6-25-98	73	JM7	25/126	AD	Blister behind eye VI lost No VI
6-25-98	88		23/31	AD	
6-25-98	84		25/133	AD	
7-2-98	77		9/132	AD	
7-2-98	83	JV5	25/98	AD	
7-4-98	72	FJ1	9/115	AD	
7-6-98	89	JW1	25/76	AD	
7-7-98	76	FD5	24/150	AD	
7-7-98	85		12/46	AD	
7-10-98	95	LA2	11/48	AD	
7-18-98	69		94/25	AD	No VI
7-24-98	88	M74	23/140	AD	No VI
7-28-98	79		12/52	AD	No VI
8-18-98	76	JY3	25/79	AD	

Appendix 11. Injuries to adult chinook returning to Rapid River during 1998.

Trap/ mark	Body injury	Gaff wound	Fish hook	Gill net	Nitrogen blister	Eye damage	Dorsal fin	Pectoral fin	Pelvic fin	Other
AD or LV	83	18	22	26	147	6	14	1	17	25
Unmarked	1	0	0	0	3	0	1	0	0	0
Total	84	18	22	26	150	6	15	1	17	25

Appendix 12. Rapid River unmarked chinook run timing for 1998

Week ending	Number of fish	Percent of unmarked chinook
May 16	0	0.00
May 23	2	4.76
May 30	1	2.38
June 6	5	11.90
June 13	9	21.43
June 20	11	26.19
June 27	8	19.05
July 4	4	9.52
July 11	1	2.38
July 18	1	2.38
July 25	0	0.00
August 1	0	0.00
August 8	0	0.00
August 15	0	0.00
August 22	0	0.00
August 29	0	0.00
September 5	0	0.00
September 12	0	0.00
Total	42	100.00

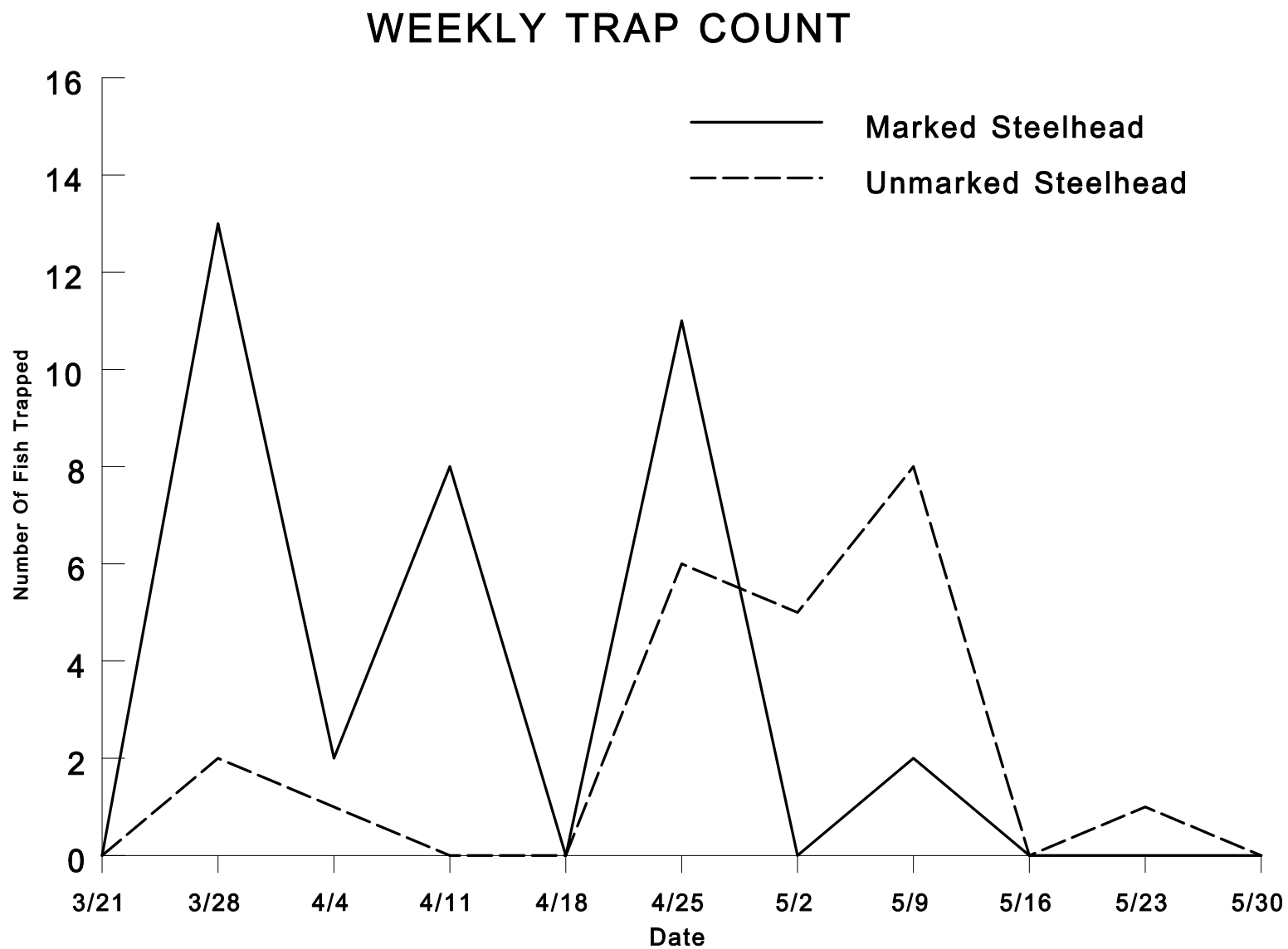
Appendix 13. Rapid River unmarked chinook lengths for 1998.

Fork length (cm)	Number of fish	Fork length (cm)	Number of fish
47		88	4
48		89	2
49		90	4
50		91	2
51		92	2
52		93	1
53		94	2
54		95	2
55		96	
56		97	1
57		98	
58		99	
59		100	1
60		>100	
61		Total run	42
62			
63			
64		Adult sex ratio	
65			
66	1	28 (66.7%)	males
67	1	14 (33.3%)	females
68		42 (100.0%)	Total
69	1		
70			
71			
72		Age-class data	
73	1	0 (0.00%)	three-year-old
74	2	8 (19.05%)	four-year-old
75	2	34 (80.95%)	five-year old
76		42 (100.00%)	Total
77			
78	1		
79	2		
80	2	Age-class criteria	
81	1	< 59 cm =	three-year old
82	1	59 - 78 cm =	four-year-old
83	1	> 78 cm =	five-year-old
84	2		
85	1		
86			
	2		
	2		

Appendix 14. Rapid River steelhead run timing for 1998.

Week ending	Number of fish	Percent of steelhead run
March 21	0	0.0
March 28	15	25.4
April 4	3	5.1
April 11	8	13.6
April 18	0	0.0
April 25	17	28.8
May 2	5	8.5
May 9	10	16.9
May 16	0	0.0
May 23	1	1.7
May 30	0	0.0
Total	59	100.0

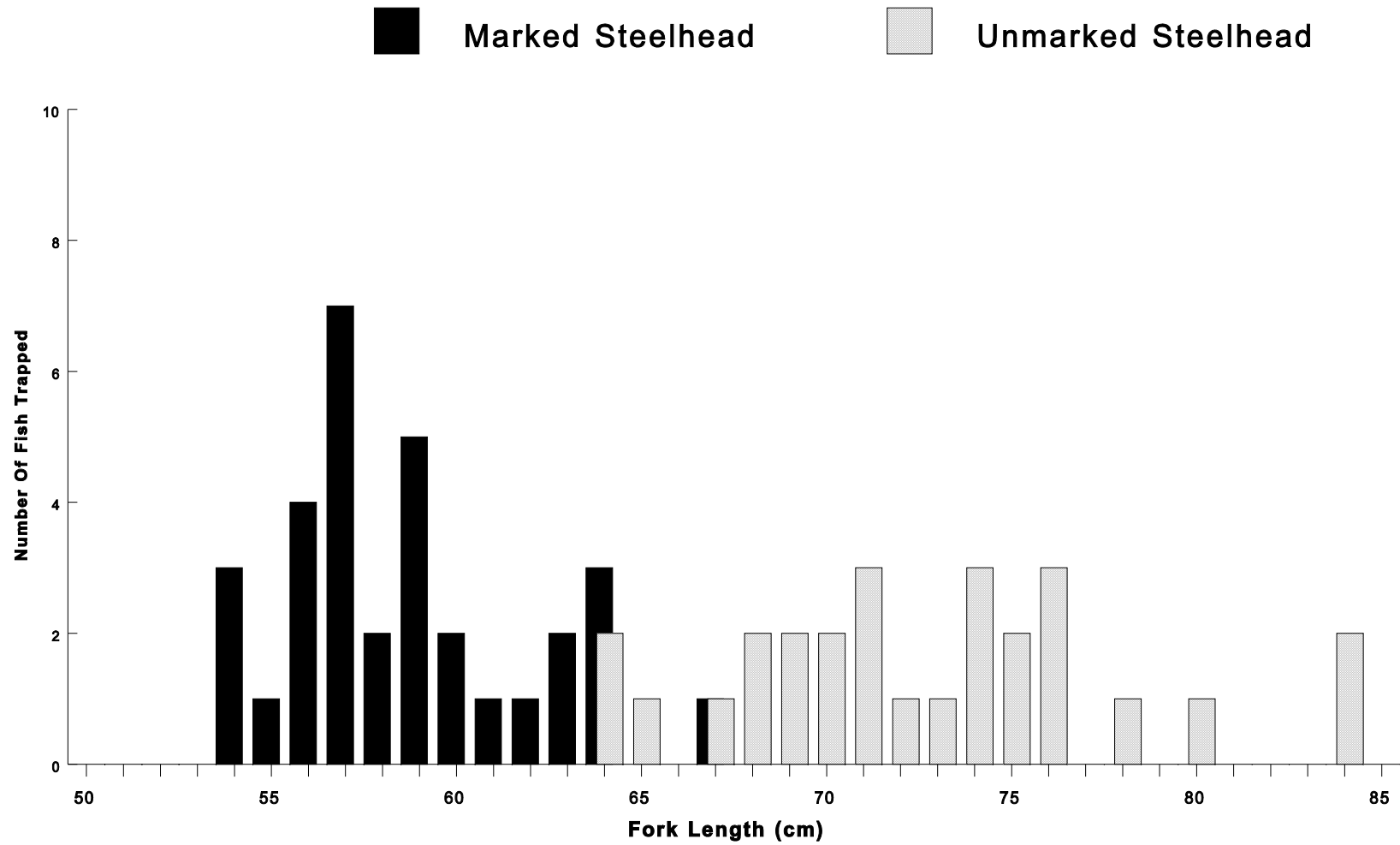
Appendix 15. Adult steelhead returns to Rapid River during 1998.



Appendix 16. Rapid River steelhead lengths for 1998.

Fork length (cm)	Hatchery		Wild	
	Male	Female	Male	Female
51				
52				
53				
54	3			
55		1		
56	2	2		
57	1	6		
58	2			
59	4	1		
60	2			
61	1			
62	1			
63	2			
64	1	2	2	
65			1	
66				
67	1		1	
68		2		
69		1		1
70		1		1
71				3
72				1
73				1
74				2
75			1	3
76				2
77				
78				1
79				
80			1	
81				
82				
83				
84			1	1
85				
86				
87				
88				
89				
Column total	20	16	7	16
Origin total	36		23	
Total run	59			

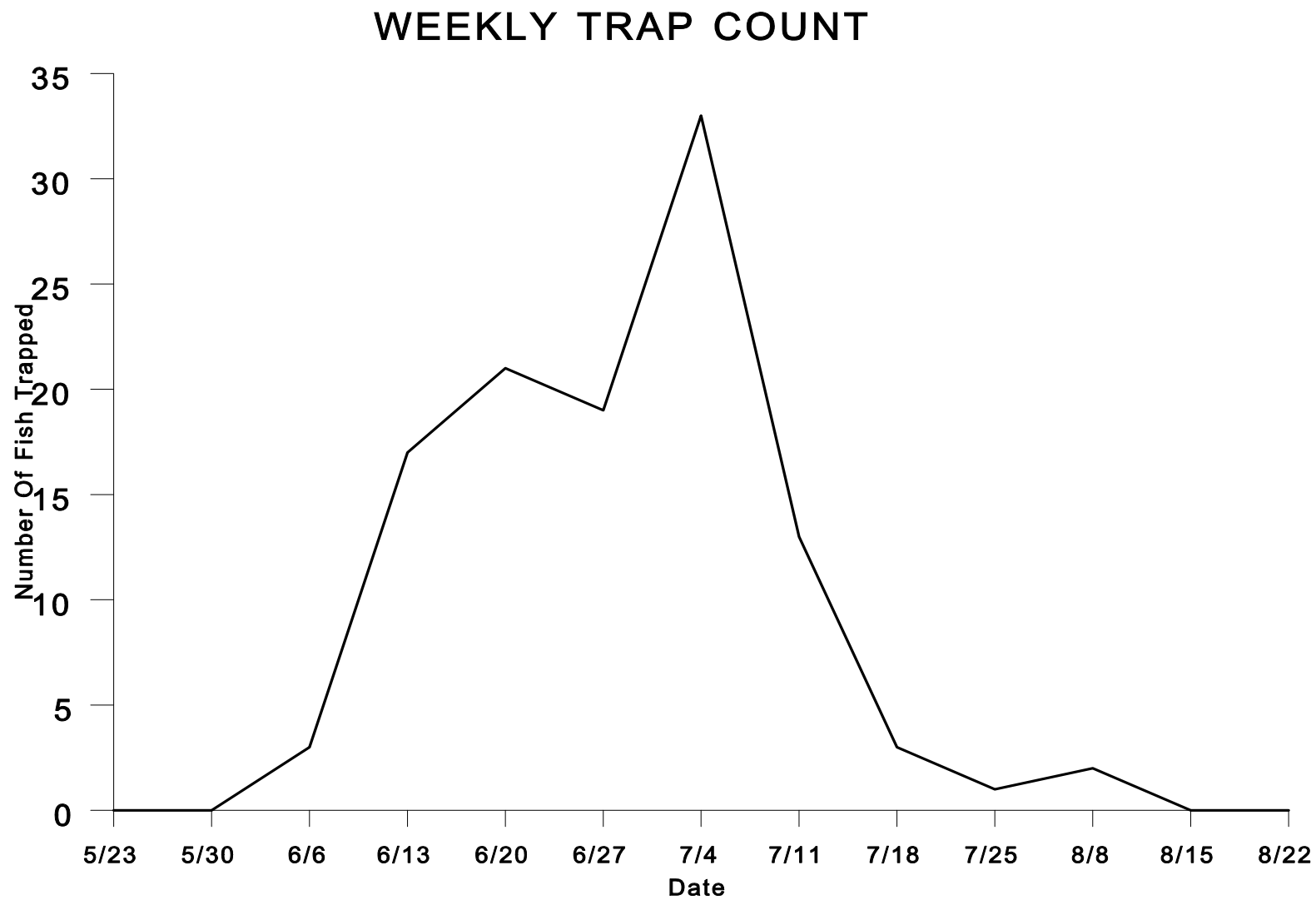
Appendix 17. Length-frequency of steelhead returning to Rapid River during 1998.



Appendix 18. Rapid River bull trout run timing for 1998.

Week ending	Number of fish	Percent of bull trout run
May 23	0	0.0
May 30	0	0.0
June 6	3	2.7
June 13	17	15.2
June 20	21	18.8
June 27	19	17.0
July 4	33	29.5
July 11	13	11.6
July 18	3	2.7
July 25	1	0.9
August 8	2	1.8
August 15	0	0.0
August 22	0	0.0
Total	112	100.0

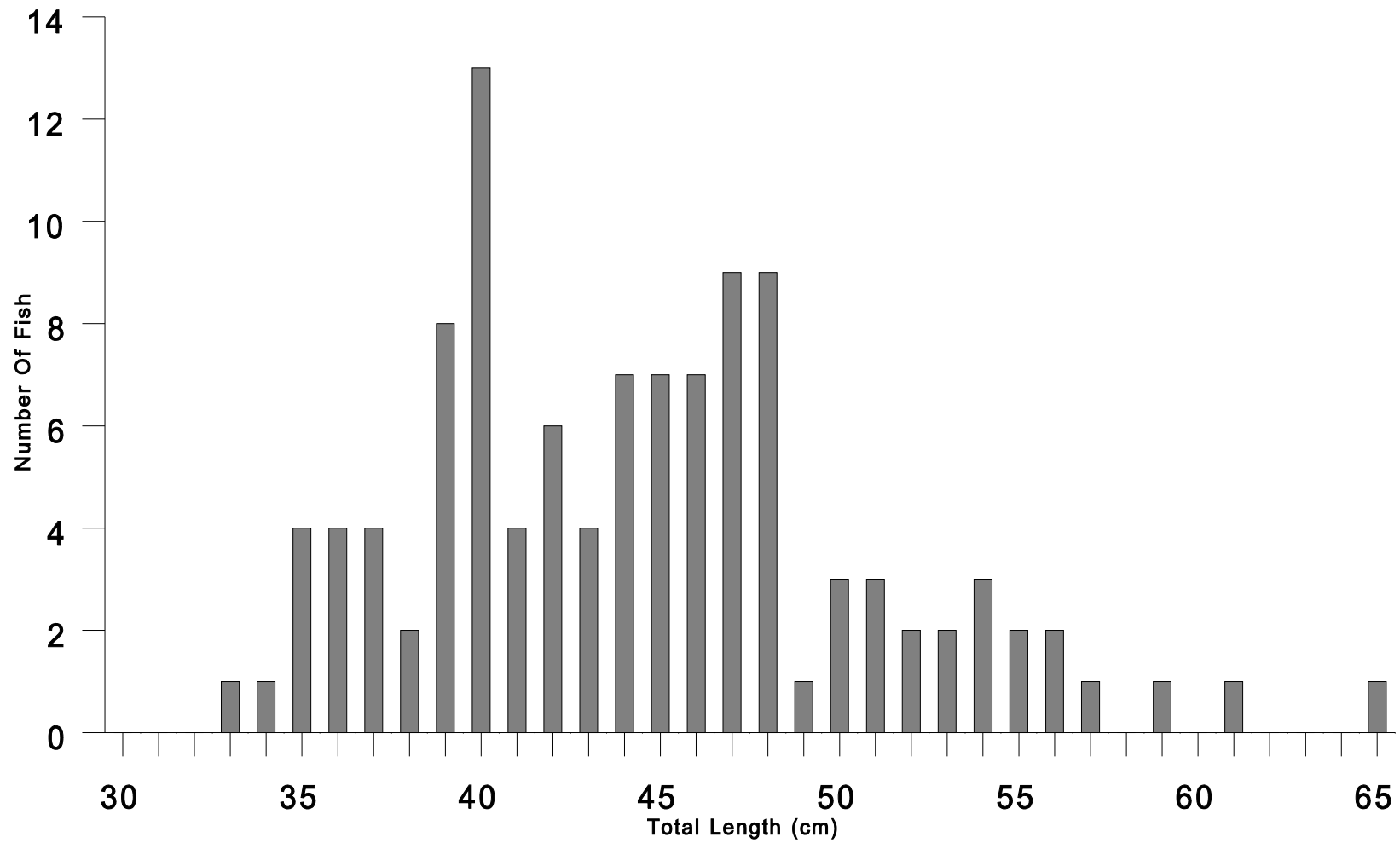
Appendix 19. Adult bull trout returns to Rapid River during 1998.



Appendix 20. Rapid River bull trout lengths for 1998.

Total length (cm)	Number of fish	Total length (cm)	Number of fish
30	0	50	3
31	0	51	3
32	0	52	2
33	1	53	2
34	1	54	3
35	4	55	2
36	4	56	2
37	4	57	1
38	2	58	0
39	8	59	1
40	13	60	0
41	4	61	1
42	6	62	0
43	4	63	0
44	7	64	0
45	7	65	1
46	7	66	0
47	9	67	0
48	9	68	0
49	1	69	0
Total			112

Appendix 21. Length-frequency of adult bull trout returning to Rapid River during 1998.



Appendix 22. Species trapped in Rapid River during 1998.

Species	Number trapped
Marked chinook	1,591
Unmarked chinook	42
Steelhead	59
Bull trout	111
Cutthroat	2

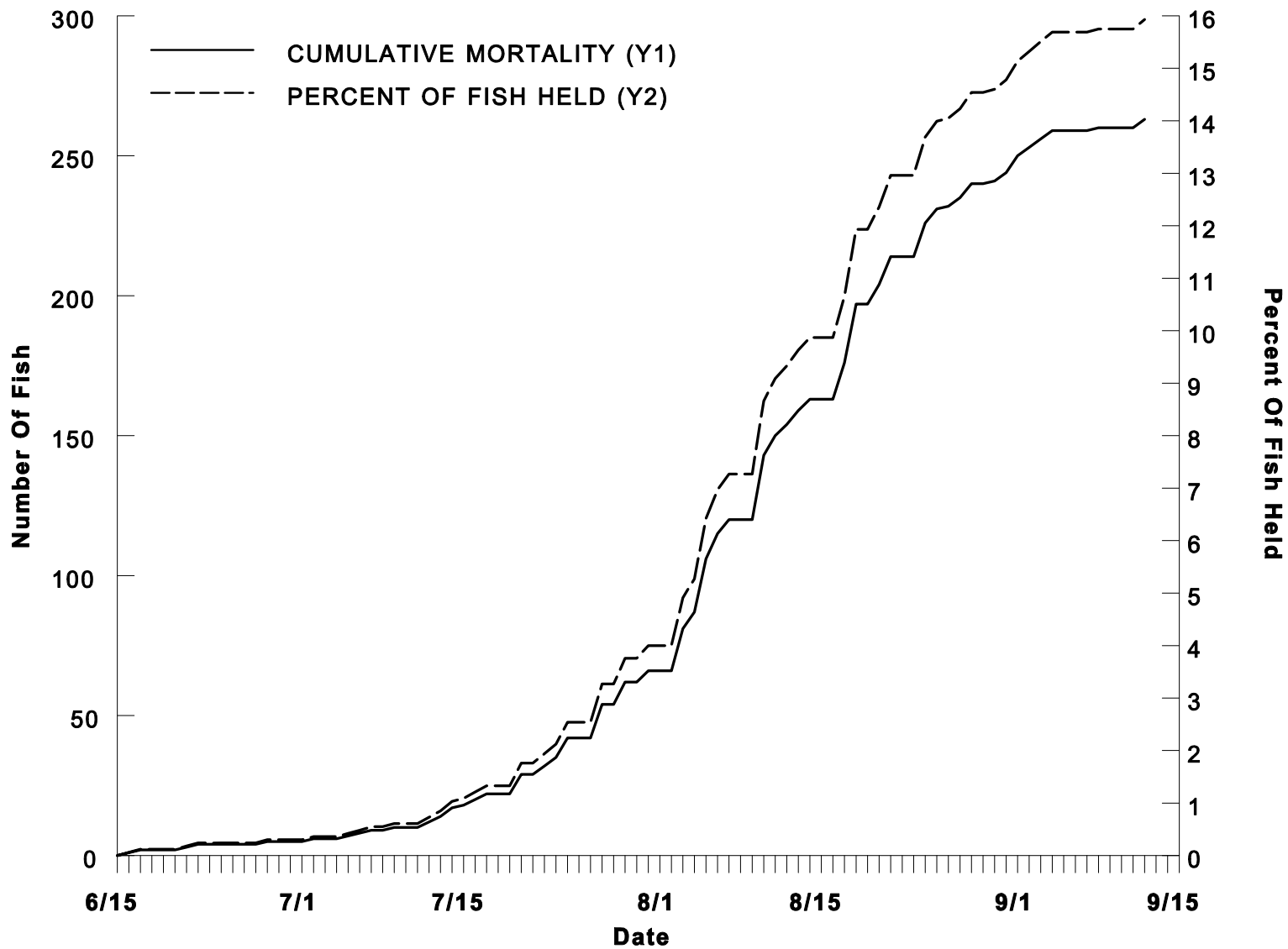
Appendix 23. Causes of prespawning mortality at Rapid River Hatchery during 1998.

Cause	Number of fish	Percent of fish held
Unknown	96	5.8
Gilled by bars at trap	5	0.3
Jaundice	11	0.7
Nitrogen burn	151	9.1
Wounds	0	0.0
Total	263	15.9

Appendix 24. Percent of head effected by nitrogen embolism on adults with emboli.

Percent of head blistered	Number of fish
<25%	4
25%	13
50%	38
75%	25
100%	71
Total	151

Appendix 25. Prespawning mortality of adult salmon at Rapid River Hatchery for 1998.



Appendix 26. Rapid River Hatchery egg enumeration for 1998.

Total eggs taken at Rapid River Hatchery in 1998. (Does not include culled eggs)						
Lot	Eyed	Bad	Green	Percent eyed	Average fecundity	Females
1	69,077	12,996	82,073	84.2	4,560	18
2	148,269	25,314	173,583	85.4	4,691	37
3	670,548	68,055	738,603	90.8	4,991	148
4	962,923	90,586	1,053,509	91.4	4,767	221
5	576,763	107,143	683,906	84.3	4,717	145
6	363,167	103,063	466,230	77.9	4,440	105
7	167,682	20,179	187,861	89.3	4,369	43
8	21,372	1,993	23,365	91.5	3,894	6
TOTAL	2,979,801	429,329	3,409,130	87.4	4,715	723

Eggs transferred to Clearwater Hatchery in 1998.

Lot	Eyed	Bad	Green	Percent eyed	Average fecundity	Females
1	3,629	137	3,766	96.4	3,766	1
2	4,703	135	4,838	97.2	4,838	1
3	64,970	11,964	76,934	84.4	5,495	14
4	135,042	11,732	146,774	92.0	4,587	32
5	176,106	31,192	207,298	85.0	4,711	44
6	73,650	19,275	92,925	79.3	4,646	20
7	48,543	7,572	56,115	86.5	4,317	13
8	4,205	665	4,870	86.3	4,870	1
TOTAL	510,848	82,672	593,520	86.1	4,710	126

Eggs reared at Rapid River Hatchery in 1998.

Lot	Eyed	Bad	Green	Percent eyed	Average fecundity	Females
1	65,448	12,859	78,307	83.6	4,606	17
2	143,566	25,179	168,745	85.1	4,687	36
3	605,578	56,091	661,669	91.5	4,938	134
4	827,881	78,854	906,735	91.3	4,798	189
5	400,657	75,951	476,608	84.1	4,719	101
6	289,517	83,788	373,305	77.6	4,392	85
7	119,139	12,607	131,746	90.4	4,392	30
8	17,167	1,328	18,495	92.8	3,699	5
TOTAL	2,468,953	346,657	2,815,610	87.7	4,716	597

Appendix 27. Rapid River brood stock ELISA results for 1998.

Lot number	Date sampled	Number sampled	Negative	Positive		
			<0.99	Low .1-.24	Moderate .25-.79	High >.80
1	8/18	20	0	17	1	2
2	8/21	41	17	19	1	4
3	8/25	165	19	115	14	17
4	8/28	242	14	178	32	18
5	9/ 1	155	3	98	44	10
6	9/ 4	115	3	82	20	10
7	9/8	44	3	27	13	1
8	9/11	7	0	5	1	1
Total	8	789	59	541	126	63

Note: Eggs from three negative or low females in lot 3 were culled because they were originally reported as high. Eggs from 63 females that tested high were culled. Eggs from 126 moderate females were transferred to Clearwater Hatchery for isolated rearing. This leaves eggs from the remaining 597 females to be incubated at Rapid River Hatchery.

Appendix 28: Rapid River Hatchery initial raceway loading densities (1/1/99–3/8/99).

Raceway	Inflow (ft ³ /sec)	Number of fish	Weight (lb)	Density Index	Flow Index
2	0.48	303,228	306	0.74	0.95
3	0.48	303,492	219	0.59	0.76
4	0.48	298,956	254	0.65	0.83
5	0.48	303,561	219	0.59	0.76
6	0.48	299,874	216	0.58	0.75
7	0.48	305,574	348	0.81	1.04
8	0.48	299,625	316	0.75	0.96
9	0.48	296,015	331	0.77	0.96

Inventory data are based on egg enumeration values when final fish were added to each raceway.

Appendix 29: Rapid River Hatchery final raceway loading densities (6/21/99).

Raceway	Inflow (ft ³ /sec)	Number of fish	Weight (lb)	Density Index	Flow Index
2	1.36	301,302	3189	0.62	1.64
3	1.36	301,975	2796	0.57	1.50
4	1.36	296,966	3030	0.59	1.57
5	1.36	302,380	2964	0.59	1.56
6	1.36	298,678	2872	0.57	1.52
7	1.36	304,686	2720	0.56	1.48
8	1.36	298,271	2405	0.51	1.35
9	1.36	299,070	2183	0.48	1.27

Inventory data are based on egg enumeration values minus documented mortality; they differ slightly from the number reported marked.

Appendix 30: Rapid River Hatchery initial pond loading densities (7/1/99).

Pond	Inflow (ft ³ /sec)	Number of fish	Weight (lb)	Density Index	Flow Index
RP-1A	6.89	400,017	3428	0.04	0.38
RP-1B	6.89	400,002	3439	0.04	0.38
RP-2A	5.28	447,000	3253	0.05	0.50
RP-2B	5.28	353,000	3468	0.05	0.48
RP-2C	5.28	399,923	3741	0.06	0.53
RP-2D	5.28	465,325	3690	0.05	0.55

Inventory data are based on reported number marked, which shows an increase of 2.5% from hatchery inventory based on egg enumeration.

Appendix 31: Rapid River Hatchery pond loading densities at release (3/16/00).

Pond	Inflow (ft ³ /sec)	Number of fish	Weight (lb)	Density Index	Flow Index
RP-1A	7.95	399,657	20,815	0.14	1.10
RP-1B	7.95	399,640	21,718	0.15	1.18
RP-2A	6.64	398,157	20,211	0.16	1.24
RP-2B	6.64	400,293	20,740	0.17	1.26
RP-2C	6.13	399,658	24,519	0.19	1.59
RP-2D	6.13	464,949	20,483	0.17	1.46

Appendix 32: Feed for brood year 1998 at Rapid River Hatchery.

Product		^a Amount used	Unit price	Total cost
Type/size	Additives			
BioDiet:				
No. 2 Starter		440.0kg	2.2300	\$ 981.20
No. 3 Starter		580.9kg	2.2300	\$1,295.41
No. 2 & No. 3	Bio Flake MC	40.9kg	1.0100	\$ 41.31
1.0 mm Grower		1360.0kg	1.7500	\$2,380.00
1.3 mm Grower		1503.2kg	1.7100	\$2,570.47
1.3 mm Grower	Aquamycin-100	1202.3kg	3.4440	\$4,140.72
1.5 mm Grower		1960.0kg	1.5900	\$3,116.40
1.5 mm Grower	Aquamycin-100	2204.5kg	3.4440	\$7,592.30
BioMoist:				
1.5 mm Grower	^b EIBS PAC	4300.0lb	0.6600	\$2,838.00
2.0 mm Grower	EIBS PAC	27750.0lb	0.7350	\$20,396.25
2.5 mm Grower	EIBS PAC	28000.0lb	0.6450	\$18,060.00
3.0 mm Grower	EIBS PAC	8750.0lb	0.6300	\$5,512.50
3.0 mm Grower	Aquamycin-100	26250.0lb	1.7730	\$46,541.25
	EIBS PAC			
3.0 mm Feed	EIBS PAC	65025.0lb	0.4950	\$32,187.38
Total		180,556.0lb		\$125,535.38

^aFeed units are given in kg or lb. as provided by manufacturer

^bEIBS PAC = 5 x C and B12, and 10 x Folic Acid.

Appendix 33: Eagle Fish Health Laboratory inspection results for brood year 1998

Brood year stock	Log number	IHN	IPN	EIBS	BKD	FUR	ERM	CWD	WHD	CSH	Comments
Juvenile samples											
RRSC	99-162	-	-		-	-	-	-			NO PATHOGENS DETECTED; VIRO 0/10, FAT 0/10, BACTE 0/8
RRSC	99-346	-	-		-	-	-	-			NO PATHOGENS DETECTED; VIRO 0/10, FAT 0/10 , BACTE 0/8
RRSC	99-437				-	-	-	-			PSEUDOMOMAS; VIRO 0/10, FAT 0/10, PSEUDOMONAS SPP. 3/8
RRSC	00-031	-	-		+				-		RS; VIRO 0/20, FAT 0/20, ELISA 1/4(1 LOW), WHD-DIGEST 0/20
Brood samples											
RRSC	98-275	+	-		+						IHNV, BKD; IHNV 6/20, IPNV 0/20, ELISA 18/20(15LOW, 3HIGH)
RRSC	98-285				+						BKD; ELISA 23/41(18 LOW, 5HIGH)
RRSC	98-290	+	-		+						IHNV BKD; IHNV 4/20, IPNV 0/20, ELISA 146/165(114 LOW, 32 HIGH), WHD-DIGEST 0/20
RRSC	98-302A				+						BKD; ELIAS 227/242(176 LOW, 51 HIGH)
RRSC	98-302B										SEE ACCESSION 98-302A
RRSC	98-309A	-	-		+						BKD; VIRO 0/20, ELISA 152/155(96 LOW, 54 HIGH)
RRSC	98-309B										SEE ACCESSION 309A
RRSC	98-309C										SEE ACCESSION 309A
RRSC	98-322A				+						BKD; ELISA 111/115(81 LOW, 30 HIGH)
RRSC	98-322B										SEE ACCESSION 322A
RRSC	98-327				+						BKD; ELISA 40/44 (26 LOW, 14 HIGH)
RRSC	98-375				+						BKD; ELISA 7/7 (5 LOW, 2 HIGH)

Appendix 34: Preliberation organosomatic index for brood year 1998.

Hematology						
Date	Hematocrit			Serum protein		
	^a Mean	^a SD	^b CF	^a Mean	^b SD	^c CF
03/02/00	39.9	1.997	0.05	9.87	1.166	0.118

^aStandard deviation

^bCoefficient of variation

Combined autopsy summary

Eyes		Gills		Pseudo- branches		Thymus		Mesen. fat		Spleen		Hind gut		Kidney		Liver		Bile	
N	20	N	20	N	20	0	20	0	0	B	0	0	20	N	20	A	0	0	0
B1	0	F	0	S	0	1	0	1	0	R	20	1	0	S	0	B	2	1	0
B2	0	C	0	L	0	2	0	2	1	G	0	2	0	M	0	C	18	2	0
E1	0	M	0	S&L	0			3	16	ON	0			G	0	D	0	3	0
E2	0	P	0	I	0			4	3	E	0			U	0	E	0		
H1	0	OT	0	OT	0					OT	0			T	0	F	0		
H2	0			O	0											OT	0		
M1	0																		
OT	0																		

Summary of normals

20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
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N = normal

OT = other

Thymus: 0 = no hemorrhage

Mesenteric fat: 0 = none, 1 = < 50% coverage, 2 = 50%, 3 = > 50%, 4 = 100%

Spleen: R = red, E = enlarged (EIBS enlarges spleens)

Hind gut: 0 = no inflammation

Liver: B = pail red

Bile: 0 = yellow bile < full bladder

Appendix 35: Rapid River Hatchery marking summary for brood year 1998

Coded wire tag releases						
Release site	Date released	Number of fish marked	Release group mark code	Clip	Purpose	Pond
Rapid River	3/15/-4/03/00	68,115	10-55-01	AD	US-Canada	1B
Rapid River	3/15/-4/03/00	67,625	10-55-02	AD	US-Canada	1B
Rapid River	3/15/-4/03/00	67,541	10-55-03	AD	US-Canada	1B
Rapid River	3/15/-4/03/00	68,309	10-55-04	AD	US-Canada	1B
Rapid River	3/15/-4/03/00	67,162	10-55-05	AD	US-Canada	1B
Rapid River	3/15/-4/03/00	61,250	AD only	AD	Hatchery ID	1B
Rapid River	3/15/-4/03/00	400,017	AD only	AD	Hatchery ID	1A
Rapid River	3/16/-4/25/00	1,665,248	AD only	AD	Hatchery ID	2ABCD
Total		2,465,267				

PIT tag releases						
Release site	Date released	^b Number of PIT-tagged fish	Release group mark code	Clip	Purpose	Pond
Rapid River	3/18-4/26/99	47,663	AD only	AD	Hatchery PIT tag study and FPC	2B

^b See the *Annual Release Summary of Marked Salmon and Steelhead* (unpublished Department document) for estimated numbers of marked fish released.

Appendix 36: Smolts released from Rapid River Hatchery in 2000 (brood year 1998).

Release site date	Release method		Number released	Weight (lb)
Rapid River				
3/15-4/17/00	Volitional release by pond:	1A	395,660	20,607
		1B	395,664	21,502
		2A	394,175	20,009
		2B	396,290	20,533
		2C	395,661	24,274
		2D	460,300	20,278
	Volitional release Subtotal		2,437,750	127,203 lb
4/03-4/25/00	Smolts flushed by pond:	1A	3,997	208
		1B	3,976	216
		2A	3,982	202
		2B	4,003	207
		2C	3,997	245
		2D	4,649	205
	Pond flush subtotal		24,604	1283 lb
Site total	Site total		2,462,354	128,486 lb
	Hatchery total		2,462,354	128,486 lb

Appendix 37: Survival from eggs to smolts at Rapid River Hatchery for brood year 1998.

^a Green eggs	Eyed egg number	^b Percent survival	Swimup	^c Percent survival	^d Marked number	Released smolts	^e Percent survival
2,815,510	2,468,953	87.7	2,414,654	85.8	2,465,267	2,462,345	99.9

^aGreen eggs retained by Rapid River Hatchery after segregation of eggs for transfer CFH.

^bPercent eye-up of eggs retained at Rapid River Hatchery.

^cPercentage of green eggs retained at Rapid River Hatchery that survived to swim-up.

^dThe reported number marked was 2.5% more than hatchery inventory at the time of marking.

^ePercent survival from marking to release was 99.9%. Percent survival from swim-up to release was 99.6%.

Appendix 38: Cost of production at Rapid River Hatchery for brood year 1998.

Number of fish	Weight of fish (lb)	Weight of feed (lb)	Cost of feed	Feed conversion	^a Total cost	Cost/ thousand fish	Cost/ pound
2,462,345	128,486	180,556	\$125,535.38	1.40	\$1,100,659.34	\$447.00	\$8.57

^aThe total represents the total cost incurred by IPC from 9/1/98 through 3/30/00. This amount may exceed cost associated with production of Brood Year 1998 due to overlap in the brood year rearing cycle (see discussion in the Cost of Production section). These costs include funds provided to the Department by IPC, as well as internal costs incurred by IPC.

Appendix 39: Returns to Rapid River Hatchery from 1964 to 2000.

Return year	Snake R. return (adults)	Rapid R. return (adults)	Rapid R. return (jacks)	Percent prespawning mortality	Females spawned	Eggs/ female	Number of eggs taken
1964	349			16	182	4,874	887,000
1965	408			21	133	4,541	604,000
1966	1,511			18	621	3,697	2,296,000
1967	974	1,039		11	581	3,537	2,055,000
1968	351	3,416	740	2	1,809	3,671	6,540,000
1969	672	2,817	1,043	8	1,415	3,655	5,151,697
1970		6,470	887	10	3,520	4,136	14,560,280
1971		3,357	1,754	19	1,722	3,507	6,038,785
1972		12,310	943	15	3,825	3,941	15,072,604
1973		17,054	286	37	3,454	3,912	13,510,465
1974		3,457	538	27	1,756	3,924	6,890,186
1975		4,428	573	7	2,184	3,894	8,503,606
1976		6,342	1,765	15	3,055	3,762	11,492,878
1977		7,767	437	11	3,781	3,745	14,160,330
1978		5,735	34	21	2,350	4,266	10,026,888
1979		3,054	350	31	1,141	4,950	5,648,722
1980		1,528	432	30	543	3,235	1,756,827
1981		3,087	176	7	1,666	3,675	6,122,273
1982		3,646	30	11	1,883	3,973	7,482,330
1983		1,864	94	15	859	4,015	3,449,471
1984		1,705	651	7	821	3,807	3,125,911
1985	673	6,376	351	8	2,962	3,741	11,535,461
1986	360	6,546	177	34	2,451	4,355	10,673,138
1987	534	3,808	210	30	1,133	4,379	5,656,145
1988	381	3,608	172	19	1,645	4,879	7,905,702
1989	86	2,372	428	11	1,082	4,139	4,478,045
1990		2,566	40	13	1,063	3,967	4,217,103
1991		1,675	238	10	657	3,886	2,553,218
1992	912	2,370	96	24	1,177	3,988	4,534,404
1993	411	4,451	17	17	1,737	4,090	6,404,312
1994	29	261	4	21	116	4,226	490,249
1995	35	70	59	7	35	3,771	132,002
1996	58	1,412	751	6	329	3,561	1,171,610
1997	788	10,510	10	10	1,138	3,930	4,472,573
1998	60	1,584	7	16	723	4,715	3,409,130
1999	22	224	639	0.8	138	4,406	608,084
2000	967	3,098	1,701	4.1	1226	3,900	4,780,850

From 1985 on, total eggs taken includes those from Snake River adults.

Appendix 40: Returns to Rapid River Hatchery by brood year.

Brood year	Year released	Release into Rapid River	3-year-olds	Year returned	4-year-olds	Year returned	5-year-olds	Year returned	Returns to Rapid River from release	% Return from release
1964	1966	588,000	1,309	1967	3,422	1968	197	1969	4,928	0.84
1965	1967	479,267	740	1968	2,620	1969	874	1970	4,234	0.88
1966	1968	1,460,150	1,043	1969	5,596	1970	364	1971	7,003	0.48
1967	1969	900,192	887	1970	2,992	1971	1,544	1972	5,423	0.60
1968	1970	3,172,000	1,754	1971	10,766	1972	4,403	1973	16,923	0.53
1969	1971	2,718,720	943	1972	12,654	1973	1,759	1974	15,356	0.56
1970	1972	2,809,200	285	1973	1,698	1974	386	1975	2,369	0.08
1971	1973	2,908,425	538	1974	4,206	1975	1,120	1976	5,864	0.20
1972	1974	2,707,917	573	1975	5,222	1976	634	1977	6,429	0.24
1973	1975	3,373,700	1,765	1976	7,110	1977	1,845	1978	10,720	0.32
1974	1976	3,358,940	437	1977	3,890	1978	2,413	1979	6,740	0.20
1975	1977	2,921,172	34	1978	598	1979	46	1980	678	0.02
1976	1978	2,412,678	350	1979	1,482	1980	146	1981	1,978	0.08
1977	1979	2,866,993	432	1980	3,068	1981	557	1982	4,057	0.14
1978	1980	2,604,823	176	1981	3,089	1982	1,206	1983	4,471	0.17
1979	1981	2,372,607	30	1982	838	1983	356	1984	1,224	0.05
1980	1982	1,476,766	94	1983	1,349	1984	199	1985	1,642	0.11
1981	1983	2,998,103	651	1984	6,177	1985	1,456	1986	8,284	0.28
1982	1984	3,246,197	351	1985	5,090	1986	1,155	1987	6,596	0.20
1983	1985	2,491,238	177	1986	2,444	1987	1,557	1988	4,178	0.17
1984	1986	1,594,688	210	1987	2,051	1988	379	1989	2,640	0.17
1985	1987	2,836,400	172	1988	1,933	1989	135	1990	2,240	0.08
1986	1988	2,630,200	428	1989	2,431	1990	421	1991	3,280	0.12
1987	1989	2,319,500	40	1990	1,254	1991	161	1992	1,455	0.06
1988	1990	2,520,400	238	1991	2,209	1992	1,905	1993	4,352	0.17
1989	1991	2,564,900	96	1992	2,546	1993	122	1994	2,764	0.11
1990	1992	2,615,500	17	1993	139	1994	9	1995	165	0.01
1991	1993	2,060,300	4	1994	61	1995	2	1996	67	0.003
1992	1994	2,547,624	59	1995	659	1996	177	1997	895	0.04
1993	1995	2,786,919	751	1996	10,333	1997	1,322	1998	12,406	0.45
1994	1996	379,167	10	1997	262	1998	72	1999	344	0.09
1995	1997	85,840	7	1998	152	1999	12	2000	171	0.20
1996	1998	896,170	639	1999	3,086	2000		2001	3,725	0.42
1997	1999	2,847,283	1,701	2000		2001		2002	1,701	0.06

Returns to Rapid River are hatchery returns and do not account for harvest.

Appendix 41: Average feed and growth data for Rapid River Hatchery.

Month	Average Water Temperature (°F)	Density Index	Flow Index	^a Feed conv.	Hatchery constant	^b Daily length increase (in)	^b Monthly length increase (in)	Condition factor C (x10 ⁴)	Percent Body Weight fed	Number Feedings per day	Average #/lb at end of month	Average length at end of month (in)
FEB	38	N.A.	N.A.	N.A.	1.98	0.0024	0.07	2.7	1.42	8	1109	1.50
MAR	41	0.24	0.59	1.07	2.26	0.0070	0.20	2.8	1.89	8	809	1.64
APR	44	0.29	0.64	1.02	3.23	0.0105	0.34	3.1	2.40	8	439	1.95
MAY	46	0.29	0.74	1.00	4.54	0.0151	0.29	3.1	2.30	8	271	2.29
JUN	49	0.0	0.69	1.20	7.10	0.0297	0.59	3.1	2.93	4	136	2.87
JUL	54	0.09	0.83	1.59	7.36	0.0155	0.47	3.6	2.75	4	79	3.43
AUG	55	0.12	1.33	1.59	7.82	0.0164	0.50	3.5	2.70	5	46	3.86
SEP	51	0.15	1.57	1.70	8.66	0.0170	0.51	3.5	2.00	5	36	4.31
OCT	46	0.16	1.69	1.71	5.03	0.0098	0.30	3.5	1.37	3	30	4.60
NOV	51	0.17	1.81	2.22	1.54	0.0023	0.07	3.5	0.47	2	28	4.67
DEC	38	0.17	1.88	4.46	2.12	0.0016	0.03	3.4	0.21	1	30	4.67
JAN	37	0.18	1.89	2.83	1.15	0.0013	0.03	3.4	0.21	1	29	4.69
FEB	38	0.18	2.01	1.24	1.47	0.0040	0.12	3.2	0.53	2	26	4.95
MAR	41	0.19	1.97	1.55	3.47	0.0074	0.22	3.2	0.92	2	22	5.19

^aFeed conversion is expressed as actual feed weight over weight gain.

^bGrowth data may vary during periods of high water.

Appendix 42: Release and transfer summary for Rapid River Hatchery for 1964 to 1998.

Brood year	No. eggs taken	Egg or fry plants and site		Smolt plants and site		Size (g/fish)
1964	887,000	None		588,000	Rapid River	20.1
1995	60,400	None		479,267	Rapid River	19.6
1966	2,296,000	None		1,460,150	Rapid River	18.1
1967	2,055,000	None		900,192	Rapid River	18.9
1968	6,540,000	757,376	eggs Clearwater H Channel	3,172,000	Rapid River	22.6
1969	5,171,697	497,000	eggs Dworshak NFH to start	2,718,720	Rapid River	21.6
1970	14,560,280	4,417,454	eggs Sweetwater Eye Stat.	2,809,200	Rapid River	23.3
		2,224	eggs Kooskia NFH.	91,800	Lochsa River	23.8
		526,516	eggs Hayden Cr. Hatchery			
		2,473,983	eggs Clearwater H Channel			
		4,607,736	eggs Rapid River Hatchery			
		200,520	fry Lemhi River			
		353,970	fry Decker Pond			
		100,000	fry Sandpoint Hatchery			
		600,000	eggs Hayden Cr. Hatchery	2,908,425	Rapid River	26.7
		53,562	fry Lemhi River	197,303	SF Clearwater	
		104,300	fry Red River			
		29,800	fry Ten Mile Creek			
		44,700	fry American River			
		14,900	fry Papoose Creek			
		59,600	fry Brushy Creek			
		44,700	fry Fish Creek			
		14,900	fry Post Office Creek			
		44,700	fry Squaw Creek (Lochsa)			
		61,500	fry Lochsa River			
		60,000	fry Ten Mile Creek			
		200,000	fry Sandpoint Hatchery			
		401,305	fry Decker Pond			
1972	15,072,604	5,256,662	eggs Sweetwater Eye Stat.	2,707,917	Rapid River	25.9
		3,012,358	eggs Hayden Creek Hatchery			
		1,293,592	eggs Red River H Channel			
1973	13,510,464	3,915,900	eggs Sweetwater Eye Stat.	3,373,700	Rapid River	30.6
		1,295,424	eggs Hayden Creek Hatchery	117,000	SF Clearwater	
		104,760	eggs Hagerman Hatchery			
		502,200	eggs Crooked R. H Channel			
		702,000	eggs Kooskia NFH			
		806,400	eggs Hayden Creek Hatchery			
		504,000	eggs Minnesota walleye trade			
		210,734	fry Sandpoint Hatchery			
		206,360	fry Kooskia NFH			
		88,480	fry Ten Mile Creek.			
		18,200	fry Newsome Creek			
		633,000	fry Lemhi River			
		10,428	fry Capehorn Creek			
		809,400	eggs Hayden Creek Hatchery	3,358,940	Rapid River	24.7
		407,012	eggs Indian Creek	205,700	SF Clearwater	
		203,500	fry Sandpoint Hatchery			
1974	6,890,186	21,840	fry Capehorn Creek			
		59,962	fry Red River			
		30,750	fry Newsome Creek			
		10,250	fry Ten Mile Creek			
		1,140,300	fry Lemhi River			

Appendix 42: (Continued).

Brood year	No. eggs take	Egg or fry plants and site			Smolt plants and site		Size (g/fish)
1975	8,503,606	2,363,200	eggs	Sweetwater Eye Stat.	2,921,172	Rapid River	28.5
		252,200	eggs	Mullan Hatchery	249,750	SF Clearwater	
		255,000	eggs	Hayden Creek Hatchery			
		280,659	eggs	Indian Creek H Chan.			
		4,906,492	eggs	Rapid River Hatchery			
		34,000	fry	Ten Mile Creek			
		156,000	fry	Lemhi River			
		65,960	fry	SF Clearwater River			
		412,800	fry	Decker Pond			
		209,950	fry	Sandpoint Hatchery			
		36,143	fry	Bear Valley Creek			
		1,161,608	eggs	Mullan Hatchery	2,413,678	Rapid River	
		2,937,994	eggs	Sweetwater Eye Stat.			
1976	11,492,878	261,900	eggs	Hayden Creek Hatchery			28.9
		261,900	eggs	Sandpoint Hatchery			
		1,267,208	eggs	Mackay Hatchery			
		47,008	fry	Univ. of Idaho			
		3,111,850	fry	Mackay Hatchery			
		104,500	fry	Lolo Creek			
		501,600	fry	Red River Pond			
		80,600	fry	SF Clearwater			
		2,633,400	eggs	Sweetwater Eye Stat.	2,866,993	Rapid River	
		2,287,800	eggs	Kooskia NFH	156,362	White Sand Cr.	
1977	14,160,330	2,689,000	eggs	Mullan Hatchery	44,373	Newsome Creek	30.2
		288,000	eggs	Hayden Creek Hatchery			
		20,700	eggs	Univ. of Idaho			
		1,007,340	eggs	Crooked River H Chan.			
		723,000	fry	Mackay Hatchery			
		50,800	fry	Decker Pond			
		200,025	fry	Red River Pond			
		265,600	fry	Lemhi River			
		767,322	eggs	Hayden Creek Hatchery	2,604,823	Rapid River	
		970,728	eggs	Mackay Hatchery	57,440	White Sand Cr.	
1978	10,026,888	1,540,282	eggs	Sweetwater Eye Stat.			30.2
		706,936	eggs	Dworshak NFH			
		38,160	eggs	Univ. Of Idaho			
		10,864	eggs	U of I Hayden Cr.			
		1,250,010	eggs	Crooked River H Chan.			
		249,696	eggs	Sweetwater Eye Stat.			
		232,500	fry	Red River Pond			
		10,000	fry	Ten Mile Creek			
		806,400	eggs	Hayden Creek Hatchery	2,372,607	Rapid River	
		330,880	eggs	Dworshak NFH	1,001,700	Snake River	
1979	5,646,722	293,249	fry	Red River Pond			21.6
		None					
1980	1,756,827				1,473,733	Rapid River	16.2
1981	6,122,273	608,384	eggs	Pahsimeroi Hatchery	2,998,103	Rapid River	20.6
		256,608	eggs	Oxbow Hatchery	250,020	Snake River	16.8
		449,280	eggs	Dworshak NFH			
1982	7,420,450	493,346	eggs	Looking Glass (Ore)	3,246,197	Rapid River	22.7
		1,332,200	eggs	Pahsimeroi Hatchery	500,850	Snake River	16.8
		375,028	eggs	Dworshak NFH			
		125,055	eggs	Hagerman NFH			
		306,000	fry	Red River Pond			

Appendix 42: (Continued).

Brood year	No. eggs taken	Egg or fry plants and site			Smolt plants and site		Fish/ pound
1983	3,449,471	None			2,491,238	Rapid River	19.7
					437,360	Snake River	16.8
1984	3,125,911	152,000	fry	Red River	159,688	Rapid River	20.6
					140,000	Snake River	22.7
					136,000	Red River	15.1
1985	11,535,461	497,520	eggs	Oregon	2,630,200	Rapid River	20.2
		3,668,000	eggs	Dworshak NFH	103,000	Snake River	14.6
		2,450,907	eggs	Sawtooth Hatchery			
		100,590	fry	Boulder Creek			
		349,650	fry	Crooked River			
		200,158	fry	Eldorado Creek			
		55,123	fry	Hopeful Creek			
		144,443	fry	Crooked Fork Creek			
		70,282	fry	White Sand Creek			
		49,437	fry	Ten Mile Creek			
		102,282	fry	Newsome Creek			
		115,352	fry	Brushy Fork Creek			
1986	10,673,138	2,368,400	eggs	Dworshak NFH	2,630,200	Rapid River	23.9
		712,905	eggs	Sawtooth Hatchery	400,600	Snake River	22.9
		348,600	fry	Crooked Fork Creek			
		202,400	fry	White Sand Creek			
		98,000	fry	Big Flat Creek			
		238,900	fry	Red River Pond			
1987	5,656,145	30,000	fry	Little Salmon River	2,319,500	Rapid River	20.6
		103,800	fry	Lolo Creek	500,000	Snake River	22.7
		137,800	fry	Eldorado Creek			
		62,200	fry	Crooked Fork Creek			
		108,300	fry	Hopeful Creek			
		72,200	fry	White Sand Creek			
		19,500	fry	Big Flat Creek			
		113,800	fry	American River			
		112,100	fry	Newsome Creek			
		100,100	fry	Meadow Creek			
		200,100	fry	Crooked River			
		50,100	fry	Red River			
		50,100	fry	Yankee Fork			
		202,000	fry	Brushy Fork			
		150,100	fry	Ten Mile Creek			
		100,200	fry	White Sand Creek			
1988	7,881,379	1,475,677	eggs	Oregon Fish and Game	2,520,400	Rapid River	17.4
		149,570	fry	Little Salmon River	250,000	Little Salmon	16.3
		100,278	fry	Ten Mile Creek	551,200	Snake river	15.1
		149,570	fry	Little Salmon River			
		100,278	fry	Ten Mile Creek			
		101,062	fry	Crooked River			
		100,862	fry	Crooked River			
		100,628	fry	Newsome Creek			
		100,299	fry	Boulder Creek			
		100,342	fry	Boulder Creek			
		100,097	fry	Newsome Creek			
		195,398	fry	Brushy Fork			
		99,919	fry	White Sand Creek			

Appendix 42: (Continued).

Brood year	No. eggs taken	Egg or fry plants and site			Smolt plants and site		Size (g/fish)
1988		100,148	fry	White Sand Creek			
		99,401	fry	American River			
		51,369	fry	American River			
		39,163	fry	Meadow Creek			
1989	3,925,585	211,509	fry	Crooked River	2,564,900	Rapid River	18.7
		548,876	fry	Sawtooth Hatchery	100,100	Little Salmon	20.2
					500,500	Snake River	20.2
1990	4,271,103	200,000	eggs	Looking Glass Hatch.	2,615,500	Rapid River	22.3
		403,400	fry	Sawtooth Hatchery	500,500	Snake River	22.3
1991	2,553,218	3,050	fry	Hayden Creek Hatchery	2,060,300	Rapid River	18.4
		10,126	fry	Squaw Creek	200,300	Snake River	16.9
		90,125	fry	White Sand Creek			
1992	4,534,404	92,897	eggs	Dworshak Hatchery	2,547,624	Rapid River	22.2
					380,600	Snake River	22.1
1993	6,404,312	2,176,157	eggs	Clearwater Hatchery	2,786,919	Rapid River	24.5
					499,536	Snake River	23.7
1994	490,249	58,791	eggs	Clearwater Hatchery	379,167	Rapid River	27.0
1995	132,002	16,402	eggs	Clearwater Hatchery	85,840	Rapid River	22.1
1996	1,171,610	168,754	eggs	Clearwater Hatchery	896,170	Rapid River	22.3
1997	4,472,573	1,015,496	eggs	Clearwater Hatchery	2,847,283	Rapid River	25.3
					200,000	Little Salmon	20.8
					300,000	Snake River	20.8
1998	3,409,130	510,848	eggs	Clearwater Hatchery	2,462,354	Rapid River	19.2
1999	606,084						
	199,010	Eggs received form Lyon's Ferry Hatchery					
2000	4,780,850	911,919	eggs	Clearwater Hatchery			

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